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GENERAL ASPECTS AND FUNCTIONS OF THE SICK BENEFIT ORGANIZATION¹

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The analysis and publication of morbidity data supplied from the records of industrial sick benefit organizations in the United States have constituted one of the activities of the Public Health Service for almost two decades. A grant from the Works Progress Administration in 1935 made possible for the first time in this country an occupational morbidity and mortality study (part of the National Health Survey) based on a large mass of industrial morbidity and mortality data. These data were transcribed from the medical records of about 550,000 members of sick benefit associations and other similar organizations covering the 5-year period 1930-34. Since it is known that data of this kind are in many instances influenced by the regulations governing these organizations, certain basic information concerning the conditions under which the organizations operate was obtained, generally at the time when the records were transcribed. It is the purpose of this paper to present this information together with other pertinent material relating to the organizations that made their records available.

DEVELOPMENT OF DIFFERENT TYPES OF SICK BENEFIT ORGANIZATIONS

For the purpose of the present study the sick benefit organizations which supplied data to the Occupational Morbidity and Mortality Study were classified thus: Mutual sick benefit associations; group insurance plans; and a third group, "all other organizations", which comprises medical care plans, companies granting to their employees sick leave with pay, and group payment plans. None of the organizations included in the third group was numerous enough to warrant separate treatment.

Mutual sick benefit associations.—Sick benefit associations developed in various ways. They are found, for instance, in connection with the early trade unions. Sidney and Beatrice Webb mention³

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² With the assistance of Dr. J. R. Miner.

³ *The History of Trade Unionism*. Longmans, Green & Co., rev. ed., New York, 1926.

the "Friendly Society" and "Friendly Benefits", the latter sometimes being a part of the activities of a craft organization; the former denotes, though not always, a type of workers' organization established for the purpose of mutual aid. Names varied as did the membership. Some of the organizations admitted workers of one craft only while others had no such limitations.

The American Friendly Societies were patterned after the English models. Membership and names varied. At times when the right of workers to organize for the purpose of collective bargaining was under dispute, the Friendly Society constituted the least conspicuous form of organization which held the workers together. Today bona-fide trade unions also pay sickness, disability, and death benefits, although the number of unions which do so is small.⁴

With the growth of large industrial establishments employing hundreds and thousands of workers, plant benefit organizations came into being.

Sick benefit associations show certain characteristics reminiscent of an earlier day.⁵ Most of them are founded on the principle of solidarity rather than upon business methods. They are not organized for profit and in most instances are not subject to the legal rules and regulations governing the commercial insurance business, as, for instance, the setting up of reserves. Sometimes dues and benefits are not calculated with regard to the risks involved. The assessment method is still being practiced by some organizations whenever the purse is empty or extraordinary needs arise. The extension of benefits, the continuation of membership after employment of a worker has been terminated, and the refusal of benefits for conditions resulting from behavior judged to be a misdemeanor (such as alcoholism, fighting, etc.) are often left to the discretion of the administrative body of the association.

Group insurance.—Commercial health insurance⁶ on individual policies was first written in the United States in 1847. Accident

⁴ No information from local unions is available concerning such activities. Of 96 national and international unions that were approached 78 answered; the following number paid benefits: 63 paid death benefits, 14 disability benefits, 12 sickness benefits, and 20 had some form of insurance. Nine unions carried group life insurance as a substitute for death benefits. The sick benefits ranged from \$4 to \$10 per week, \$5 being the most common amount. Benefit periods ranged from 7 to 16 weeks, 13 weeks being the most common. Disability benefits usually were paid in a flat sum, ranging from \$50 to \$800. Only three organizations made weekly or monthly payments for disability. Death benefits ranged from \$20 to \$1,500, \$50 being the most common minimum, \$200 to \$300 the most common maximum. (Beneficial Activities of American Trade Unions. Bulletin No. 465, U. S. Bureau of Labor Statistics, Washington, 1928.)

Provision of medical care was found to be one of the activities of six unions. One branch of the United Mine Workers of America (in Wyoming), and a branch of the International Union of Mine, Mill, and Smelter Workers provide such benefits. The following four unions also provide medical care: New York Letter Carriers, Empire Branch No. 36, New York City; Employees' Mutual Benefit Association, Milwaukee; Womens' Local, Bureau of Engraving and Printing, Washington, D. C.; and Union Labor Benefit League, Los Angeles, Calif. (Williams, Pierce: The Purchase of Medical Care Through Fixed Periodic Payment. National Bureau of Economic Research, Inc., New York, 1932, pp. 291-301.)

⁵ No attempt is made here to discuss the benefit activities of fraternal societies.

⁶ Williams, Pierce: Cited in footnote 4, p. 253 ff.

coverage was added a few years later. The practice grew, and by 1910 casualty insurance companies covered practically all diseases. In 1896 life insurance companies entered the field and gradually expanded the coverage of risks.

Group health insurance as compared with individual insurance is relatively new. The first policy was written in 1911. Group insurance has been defined as "an attempt by insurers to insure a number of individuals forming a group under a simple blanket policy at reduced rates made possible by the elimination of medical examinations and other cost factors."⁷

While the activities of mutual sick benefit associations generally are not subject to State insurance laws, group insurance must conform to these laws. State insurance laws are not uniform. They have been divided into three groups:⁸

1. Statutes which are capable of interpretation to permit temporary or total disability, accidental death, or dismemberment insurance in group form (Washington and North Carolina).

2. Statutes which attempt neither to define group insurance nor to enumerate permissible groups, but merely except such policies from general rules which otherwise might invalidate them (Arizona, Connecticut, Florida, Idaho, Maine, Minnesota, West Virginia, New Hampshire, Mississippi, Nebraska, Oklahoma, Kansas, and Delaware). This lack of affirmative regulation accords insurance companies freedom to apply the group insurance plan to new situations.

3. Statutes regulating minor phases of group insurance, thereby acknowledging its legality (Tennessee, Georgia, Illinois, Kentucky, Louisiana, New Mexico, South Carolina, Missouri, Alabama, Maryland, Montana, Nevada, North Dakota, Rhode Island, South Dakota, Utah, Vermont, and Wyoming. In approximately 10 of these States there is no mention of group insurance.)

Group insurance does not usually require the applicant to pass a physical examination. Thus health and life insurance are made available to those employees who, because of physical defects, could not obtain individual policies. Group insurance may either be compulsory for all employees of the plant, or it may be voluntary. In the latter case, the insurance company as a rule requires that at least 75 percent of the employees join, in order to have a fair distribution of risks. Groups presenting unfavorable risks are either excluded or premiums are calculated accordingly.

*Group payment plans.*⁹—Group payment plans represent an attempt to provide members of the "plan" with medical care in time of need by enabling them to include the expense of medical care in their monthly budgets.

⁷ Standard definition of the National Convention of Insurance Commissioners, 1918, quoted in *Some Economic and Legal Aspects of Group Insurance Policies*, Columbia Law Review, vol. 36 (January), 1936, p. 89 ff.

⁸ *Ibid.*, p. 94 ff.

⁹ "Group payment plans" are classified in this paper under "All other organizations."

As a rule, both mutual sick benefit associations and group insurance offer cash benefits as a substitute for wage income when sickness suspends the earning power of the insured. Some of these organizations provide benefits in kind, such as services of a physician or a hospital or both.

Group payment plans are of recent origin.¹⁰ Plans differ widely in details, but all of them are unified in the objective of making the unpredictable cost of medical care a budgetable item by spreading the risk of sickness among a group of people. This purpose is accomplished by having a group of subscribers make equal and regular payments into a common fund which is used to pay medical bills for those requiring medical care.

The scope of medical care provided varies. A considerable number of plans offer only hospital services.¹¹ Plans may be State-wide in their inclusion of hospitals, as in the case of North Carolina and Alabama; city-wide; or they may include only several hospitals in one city or area, or be limited to one hospital exclusively.

Hospital service plans do not affect the patient's free choice of physician and the financial arrangements between patient and physician.

Other plans, often initiated and controlled by a medical society, offer physicians' services; still others provide both physicians' and hospitals' services. Sometimes plans providing complete medical care are organized in the form of a group clinic.

The remaining sections of the paper will examine the data obtained from the sick benefit organizations.

GENERAL ASPECTS

Collection of data.—The sick benefit organizations discussed in this paper supplied data to the Occupational Morbidity and Mortality Study. Wherever possible the information pertaining to the rules and regulations of the sick benefit organizations was obtained from the constitution and bylaws of each organization; in the absence of printed information an effort was made to secure the data from an official of the organization. In some cases information was not available.

TYPES OF SICK BENEFIT ORGANIZATIONS

The sick benefit organizations may be classified as follows:

1. *Mutual sick benefit associations.*—Included in this group are all organizations which operate on the basis of mutual aid and which pay a cash benefit upon the sickness of a member without recourse to

¹⁰ The first hospital service plan was established in Dallas, Tex., in 1930. (Rorem, C. Rufus: *Group Budgeting for Hospital Care*, American Hospital Association, 2 ed., Chicago, 1936, p. 4.)

¹¹ These plans had about 720,000 members on Jan. 1, 1937. Of this number, more than 600,000 were enrolled with 35 nonprofit associations, the 18 largest reporting 374,000 employed subscribers and 212,000 dependents. (Hospitals, vol. 11 (February 1937), p. 69.)

commercial insurance. Administrative control divides this group into three classes:

(a) *Employee-managed associations*: These are governed by the employees themselves, either by an individual or by a board composed of employees. As a rule, the administrative officer or board is elected by the members. In a few instances one or more members of the board are appointed by the employer. Whenever such appointees are workers, the association has been classified as "employee managed."

(b) *Employer-managed associations*: This term was applied to associations which are controlled by the company, either by an individual or by a board appointed by the company.

(c) The third class was called "jointly managed" because administrative control is exercised by the members of the association and by the employer.

2. *Group insurance*.—This group includes all commercial insurance plans.

3. *All others*.—These comprise different types. Several of the companies included in this study have no sick benefit organization, but provide sick leave with pay and keep records of the illness of employees through a relief department or a company dispensary. The medical care plans are also listed in this group.

A total of 731 industrial plants is included in this study; 54 did not report their type of sick benefit organization. Three hundred and six, or 45 percent, of those reporting type operate mutual sick benefit associations. Of these, 158 are employee managed, 28 are employer managed, and 120 are jointly managed. Three hundred and twenty, or 47 percent, of the plants reporting type subscribe to group insurance plans; and 51 plants operate organizations classified as "all others." Table 1 summarizes these data.

TABLE 1.—*Number and percent of plants with indicated type of sick benefit organization*

Type of organization	Plants	
	Number	Percent
Total with known type ¹	677	100.0
Mutual sick benefit associations.....	306	45.2
Employee managed.....	158	23.4
Employer managed.....	28	4.1
Jointly managed.....	120	17.7
Group insurance plans.....	320	47.3
"All others".....	51	7.5

¹ 731 plants are included in the study; 54 failed to report on type.

DISTRIBUTION OF SICK BENEFIT ORGANIZATIONS IN RELATION TO PLANT UNITS ¹²

The distribution of sick benefit organizations in relation to plant units is shown in table 2. A total of 381 organizations covers 731 plants.

¹² A "plant" as used in this study is not necessarily a factory in which goods are manufactured. For present purposes the term was also applied to the territorial offices and shops of the various railroads.

In 337 cases a benefit organization applies only to 1 plant, while 44 organizations cover 394 plants. In 26 instances 1 organization includes 2 plants; in 5 cases, 3 plants. The largest number of plants covered by 1 organization was 73, the next largest, 60. Both of these organizations are group-insurance plans.

TABLE 2.—*Distribution of types of sick benefit organizations according to the number of plants covered by each*

Number of plants covered by 1 sick benefit organization	Number of sick benefit organizations covering specified number of plants					Total number of plants covered
	All types	Mutual sick benefit associations	Group-insurance plans	All other types	Type unknown	
Total	381	155	147	41	38	731
1	337	133	131	40	33	337
2	26	12	11		3	52
3	5	3	1		1	15
4	1	1				4
6	1	1				6
11	1			1		11
12	2	1			1	24
15	2	1	1			30
16	1		1			16
20	1	1				20
36	1	1				36
47	1	1				47
60	1		1			60
73	1		1			73

DISTRIBUTION OF PLANTS WITH SICK BENEFIT ORGANIZATIONS BY STATES AND GEOGRAPHIC REGIONS

The plants included in this survey are located in 41 States, the District of Columbia, the Hawaiian Islands, and Canada.¹³ As is indicated, among other things, in table 3, 50 percent of the plants are located in the New England, Middle Atlantic, and East North Central States. The Mountain and Pacific States account for 20 percent of the plants.

The distribution of types of organizations by geographic region shows a preponderance of mutual sick benefit associations in the New England States. Forty, or 74 percent, of all plants in this region were included in this type of organization. Of these, 34, or 85 percent, are in Massachusetts. The South Atlantic States show the next largest percentage of mutual benefit associations, namely, 40, or 61 percent. Of these, 23, or over one-half, are located in Maryland.

¹³ The geographical distribution of plants is influenced by the fact that only 17 States originally were included in the Occupational Morbidity and Mortality Study. These States are California, Illinois, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, Ohio, Oregon, Pennsylvania, Texas, Utah, Virginia, and Washington. Additional plants in other jurisdictions than these 17 are included mainly because some of the industries studied in the original 17 States maintain branch offices, factories, or shops outside of these States. The additional jurisdictions comprise 24 States, the District of Columbia, the Hawaiian Islands, and Canada. The 24 States are Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Indiana, Iowa, Kansas, Kentucky, Maine, Nebraska, Nevada, New Hampshire, New Mexico, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, West Virginia, and Wisconsin.

TABLE 3.—*Geographic distribution of plants with different types of sick benefit organizations, and distribution in each geographic region of plants according to type of sick benefit organization*

Geographic region ¹	All plants		Plants with—											
			Mutual sick benefit associations			Group-insurance plans			All other types			Type unknown		
	Number	Percent	Number	Percent	Percent of all plants in the indicated region	Number	Percent	Percent of all plants in the indicated region	Number	Percent	Percent of all plants in the indicated region	Number	Percent	Percent of all plants in the indicated region
All regions.....	731	100.0	306	100.0	41.8	320	100.0	43.8	51	100.0	7.0	54	100.0	7.4
New England.....	54	7.4	40	13.1	74.1	8	2.5	14.8	2	3.9	3.7	4	7.4	7.4
Middle Atlantic.....	182	24.9	73	23.9	40.1	87	27.2	47.8	11	21.6	6.0	11	20.4	6.1
East North Central.....	135	18.5	59	19.3	43.7	58	18.1	42.9	9	17.6	6.7	9	16.7	6.7
West North Central.....	93	12.7	32	10.4	34.4	50	15.6	53.8	1	2.0	1.1	10	18.5	10.7
South Atlantic.....	66	9.0	40	13.1	60.6	23	7.2	34.9	3	5.9	4.5	-----	-----	-----
East South Central.....	12	1.6	5	1.6	41.7	7	2.2	58.3	-----	-----	-----	-----	-----	-----
West South Central.....	40	5.5	11	3.6	27.5	25	7.8	62.5	2	3.9	5.0	2	3.7	5.0
Mountain.....	19	2.6	8	2.6	42.1	11	3.5	57.9	-----	-----	-----	-----	-----	-----
Pacific.....	127	17.4	37	12.1	29.1	49	15.3	38.6	23	45.1	18.1	18	33.3	14.2
Hawaiian Islands.....	1	.1	1	.3	100.0	-----	-----	-----	-----	-----	-----	-----	-----	-----
Canada.....	2	.3	-----	-----	-----	2	.6	100.0	-----	-----	-----	-----	-----	-----

¹ New England: Connecticut, Maine, Massachusetts, and New Hampshire. Middle Atlantic: New Jersey, New York, and Pennsylvania. East North Central: Illinois, Indiana, Michigan, Ohio, and Wisconsin. West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, and South Dakota. South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia. East South Central: Alabama, Kentucky, and Tennessee. West South Central: Arkansas, Louisiana, Oklahoma, and Texas. Mountain: Arizona, Colorado, Nevada, New Mexico, and Utah. Pacific: California, Oregon, and Washington.

A predominance of group-insurance schemes as compared with mutual benefit associations is found in the West South Central States, namely, 25, or 63 percent. Ten of these are in Oklahoma, and seven in Texas. In the West North Central, East South Central, and Mountain States the percentages of group-insurance plans as compared with mutual sick benefit associations exceeded 50, the figures being 54, 58, and 58, respectively.

The picture changes, however, if the geographical distribution of each type of organization is considered separately. Almost one-fourth, namely, 73, or 24 percent, of all plants with mutual sick benefit associations are found in the Middle Atlantic States; 59, or 19 percent, in the East North Central States; 40, or 13 percent, in the South Atlantic States; and 37, or 12 percent, in the Pacific States.

Eighty-seven, or 27 percent, of the plants with group-insurance plans operate in the Middle Atlantic States; 58, or 18 percent, in the East North Central; 50, or 16 percent, in the West North Central; and 49, or 15 percent, in the Pacific States.

Of the group "all others", 23, or 45 percent, are located in the Pacific States. Of these, 14 are in California. Twelve of the 23 plants covered by the organizations included in this group have "medical care plans." Of these, seven are in California and five in Washington.

DISTRIBUTION OF PLANTS WITH SICK BENEFIT ORGANIZATIONS BY INDUSTRIES
AND INDUSTRIAL GROUPS

An aggregate of 79 industries which belong to 20 industrial groups are represented in this study. Five industrial groups—transportation and communication, chemical and allied industries, iron and steel machinery and vehicles, food and allied industries, and electric industries—include 529, or 72 percent, of the plants.

Over one-third, or 36 percent, of the plants are found in the transportation and communication group. Steam railroads constitute the largest number of plants in this group, namely, 62 percent of the group and 22 percent of all plants. The next largest number of plants is found in the chemical and allied industries, namely, 13 percent. This group comprises 6 industries. Thirty-nine percent of the plants belong to the soap factories, 13 percent to paint and varnish factories. The iron and steel machinery and vehicle industries contain 10 percent of all plants; 22 percent of this group are found in iron and steel machinery and 14 percent in blast furnaces and steel rolling mills.

The food and allied industries contain 8 percent of the plants, with slaughter and packing houses (39 percent of this group) predominating. The electric industries present 6 percent of the plants. These are about evenly divided between electric light and power plants and public utilities (51 percent) and electric machinery and supply factories (49 percent).

The remaining plants are distributed among agriculture, fishing, and forestry; extraction of minerals; clay, glass, and stone; clothing; metal (lead and zinc plants comprise 48 percent of the plants); leather (shoe factories represent 64 percent of the plants); lumber and furniture (saw and planing mills represent 82 percent of the plants); paper, printing, and allied industries (pulp and paper mills comprise 46 percent, and printing, publishing, and engraving 31 percent of the plants); textile industries; wholesale and retail trade; banking and brokerage; public service; professional service; domestic and personal service, and miscellaneous industries.

The industrial distribution of types of sick benefit organizations shows that 388, or 57 percent, of all plants for which the type of sick benefit organization is known are concentrated in 9 industries—postal service; steam railroads; soap factories; slaughter and packing houses; chemical factories; bus, cab, transfer, and truck business; iron and steel factories; electric machinery and supply factories; and public service. Thirty-five percent of the "employee managed" organizations are found in the postal service, and 54 percent of the "employer managed" in steam railroads. Thirty percent of the plants with "jointly managed" mutual benefit associations are found in the soap industry, 17 percent in slaughter and packing houses, and 13 percent in steam railroads. Thus 141, or 46 percent, of all plants

with mutual sick benefit associations are found in the four industries mentioned. A total of 194, or 61 percent, of the group insurance plans operate in 5 industries: 41 percent in steam railroads; 6 percent in chemicals; 5 percent in bus, cab, transfer, and truck; 5 percent in iron and steel; and 4 percent in electric machinery and supply factories.

Forty-one percent of "all other" organizations are found in two industries—21 percent in chemicals and 20 percent in public service.

DISTRIBUTION OF MEMBERS OF SICK BENEFIT ORGANIZATIONS

The number of members refers to the year 1934. Males and females are not separated. Forty-two plants, 5.7 percent, did not report the number of members. The number of members of sick benefit organizations must not be confused with the number of persons whose sickness records were studied. While the number of members refers to the year 1934, the study of the sickness records extended over a 5-year period, from 1930 through 1934. During this period greater or lesser labor turnover took place in all industries. In some instances only a sample of the members of a sick benefit organization was studied. This fact accounts for the differences between membership and persons studied in those groups where the latter show a smaller number than the former. The total number of "known" members is 621,370; the total number of persons studied is approximately 550,000. The ratios of these two groups varies from industry to industry.

The industrial distribution of members follows the distribution of plants to some extent. A total of 467,600, or 75 percent, of the members are located in 6 industrial groups. Thirty-two percent of the total members are found in transportation and communication; of this group, 65 percent are employees of steam railroads. Twelve percent of all members work in the iron and steel machinery and vehicle industries; 37 percent of this group are found in blast furnaces and steel rolling mills, 21 percent in iron and steel machinery. Eleven percent are employed in the food and allied industries; of these, 72 percent belong to slaughter and packing houses. Eight percent are found in the electrical industries; of these, 53 percent work in electric light and power plants and public utilities, 47 percent in electric machinery and supply factories. Six percent of all members are employed in leather manufacturing; of these 90 percent work in shoe factories. The chemical and allied industries employ 6 percent of all members; of these, 20 percent work in soap factories, 18 percent in paint and varnish factories, and 18 percent in petroleum refineries. The remaining 25 percent of all members are distributed among 14 industrial groups.

The distribution of members among the different known types of organizations (table 4) shows that 66 percent belong to mutual sick benefit associations (18 percent to employee-managed organizations,

19 percent to employer-managed organizations, and 29 percent to jointly managed organizations); 25 percent of the members are covered by group insurance plans; and 9 percent belong to organizations classified as "all others."

TABLE 4.—*Distribution of members of sick benefit organizations according to type of organization*

Type of organization	Members	
	Number	Percent
Total with known type ¹	586,260	100.0
Mutual sick benefit associations.....	387,070	66.0
Employee managed.....	107,420	18.3
Employer managed.....	111,050	18.9
Jointly managed.....	168,600	28.8
Group insurance plans.....	149,320	25.5
"All others".....	49,870	8.5

¹ Of the grand total of 621,370 known members of sick benefit organizations, 35,110 belonged to organizations that failed to report on type.

DATE OF ESTABLISHMENT OF SICK BENEFIT ORGANIZATIONS

As is to be expected, there is a distinct difference in the date of establishment among the types of sick benefit organizations. This date is known for 391 of the plants. One hundred and thirty-four, or 95 percent, of the group insurance plans for which the date of establishment is known came into existence in or after 1925, while 183, or 84 percent, of the mutual sick benefit associations with known date of origin were organized prior to 1925. Of all organizations established prior to 1890 and up to 1925, 86 percent are mutual sick benefit associations, while only 19 percent of all organizations founded in the period 1925-34 belong to this group. Seventy-six percent of sick benefit plans which came into being in the period 1925-34 are group insurance plans.

If all organizations with known date of origin are considered, mutual sick benefit organizations established prior to 1890 and up to 1925 constitute 47 percent of all plans, while the group insurance plans established between 1925 and 1935 constitute 34 percent of all plans.

If only the last 5 years under consideration (1930-34) are regarded, the predominance of group insurance plans among plants included in this study is apparent. Sixty-five percent of the organizations which arranged for sick benefits during this period subscribe to group insurance. Twenty-eight percent were organized on the basis of mutual aid, and only 1 percent belongs to the group "all others."

In the following groups of States the growth of sick benefit organizations in the 10 years 1925-34 was about equal to that of the entire

period from before 1890 to 1925, not considering organizations which were established and terminated during this period:

Middle Atlantic States: Before 1925, 50 percent; 1925-34, 50 percent.

East North Central States: Before 1925, 52 percent; 1925-34, 48 percent.

Pacific States: Before 1925, 51 percent; 1925-34, 49 percent.

In the following groups of States a greater number of sick benefit organizations was established in the period prior to 1925 than since:

New England States: Before 1925, 74 percent; 1925-34, 26 percent.

West North Central States: Before 1925, 69 percent; 1925-34, 31 percent.

South Atlantic States: Before 1925, 66 percent; 1925-34, 34 percent.

Mountain States: Before 1925, 67 percent; 1925-34, 33 percent.

Only two groups of States showed a greater growth in the later period:

East South Central States: Before 1925, 25 percent; 1925-34, 75 percent.

West South Central States: Before 1925, 32 percent; 1925-34, 68 percent.

However, in some of these States or groups of States the number of plants for which the date of establishment of a benefit organization is known is too small for the percentages to be significant.

In three groups of States—Middle Atlantic, East North Central, and Pacific—20 percent or more of the organizations included in this study were established since 1929. In two groups of States, East South Central and Mountain, no organizations were established since 1929.

Of the plants which established benefit organizations in the decade 1925-34, 39 percent belong to the industrial group transportation and communication, 13 percent to the chemical and allied industries, 12 percent to iron and steel machinery and vehicle industries. Thus two-thirds of the plants with benefit organizations established during this decade belong to three industrial groups. Four groups, transportation and communication (16 percent), chemical and allied industries (21 percent), iron and steel machinery and vehicle industries (11 percent), and food and allied industries (14 percent) contain two-thirds of the plants which founded sick benefit organizations prior to 1925.

The following industrial groups established 50 percent or more of their organizations since 1924: Transportation and communication (66 percent); public service (63 percent); clay, glass, and stone factories (60 percent); lumber and furniture industries (50 percent); extraction of minerals (67 percent); domestic and personal service (50 percent). Of these, two groups—public service and extraction of minerals—established about two-thirds of their organizations since 1929.

RULES GOVERNING MEMBERSHIP

General requirements.—Of the 691 plants which reported their membership requirements, 6 reported “no special requirements.”

Since, as a rule, only employees may become members of a sick benefit organization, these six plants were included in the group of plants which have only one membership requirement, namely, that the applicant must be an employee. Thus 584, or 84 percent, of the 691 plants require only "employee status" of the applicant for membership. Twenty-six of these plants specify that the employment must be permanent or full time. Sixty-seven, or 10 percent, of the plants which reported requirements specify "good health" in one form or another. The remaining 6 percent have various requirements, such as "white males", "wage earners with dependents", etc.

In 518, or 71 percent, of the plants, membership is voluntary. In this group both mutual benefit associations and group insurance plans are represented, each with 45 percent of the plants. In the compulsory group, comprising 207 plants, 34 percent are covered by mutual benefit associations and 41 percent by group insurance.

Age limits.—Four hundred and fifty, or 62 percent, of the plants have no age limits for membership. Of these, 128, or 28 percent, belong to mutual sick benefit associations, and 267, or 59 percent, to group insurance plans. Of all plants with mutual sick benefit associations the 128 which have no age limits constitute 42 percent, while of the plants covered by group insurance 83 percent have no age limits. Of the remaining 234 plants which specify age limits, 167 have only upper age limits, 12 only lower limits, and 55 have both lower and upper age limits. The lower limits vary from 14 to 21 years, the upper from 35 to 70 years.

Exclusion of persons with chronic diseases.—Two hundred and ten, or 29 percent, of all plants debar from membership persons afflicted with chronic diseases. A total of 172, or 56 percent, of the mutual benefit associations have such a ruling, while 288, or 90 percent, of the plants having group insurance do not debar such persons from membership. Of the 172 mutual benefit associations which exclude persons with chronic diseases, 104, or 60 percent, admit such persons to membership with the understanding that no benefits will be paid for these diseases.

The following defects, mentioned in some of the constitutions and bylaws of mutual sick benefit associations, debar from membership: Hernia, venereal diseases, trench mouth, gastric ulcer, decayed teeth, alcoholism, pregnancy, diseases of the heart and vascular system, tuberculosis, any "constitutional disease", and any condition likely to cause disability or sickness. In some cases a person's exclusion from membership is left to the discretion of the company or association.

Occupations excluded.—Six hundred and four, or 83 percent, of all plants admit to membership persons in all occupations. Two hundred and six, or 34 percent, of these operate mutual benefit associations; 50 percent have group insurance plans.

Service requirements.—A total of 185, or 25 percent, of all plants admit a person to membership immediately upon application; 535, or 73 percent, require varying periods of employment before a worker becomes eligible for membership. Seventy-five, or 10 percent, of the plants require less than 30 days' employment; 94, or 13 percent, require 30 days; 91, or 12 percent, require 61 to 120 days; 210, or 29 percent, require 121 to 180 days; and 29 plants require a full year's employment.

Of the plants with mutual benefit associations, 111, or 36 percent, admit workers to membership immediately upon employment. Another 132, or 43 percent, require from 1 to 30 days of employment. Thus these two groups account for 79 percent of all plants with mutual benefit associations.

Only 11, or 3 percent, of the plants operating under group insurance plans admit a person to membership immediately upon employment. Sixty-six, or 21 percent, of the plants require from 61 to 120 days, while 197, or 62 percent, require from 121 to 180 days. These two groups together constitute 83 percent of all plants with group insurance.

Retention of membership.—(a) During lay-offs. In 451, or 62 percent, of the plants members of sick benefit organizations may retain their membership and be entitled to sick benefits during lay-offs. In 154, or 21 percent of the plants, membership may be retained for 15 days to 1 month; in 201, or 28 percent, for 32 days to 6 months; 52, or 7 percent, of the plants allow continuation of membership indefinitely; and 212, or 29 percent, of the plants terminate membership upon the occurrence of a lay-off. (b) After separation. Five hundred and nineteen, or 71 percent, of all plants require termination of membership upon discharge of the worker. A total of 138 permit continuation of membership for varying periods of time—42 for 15 days to 1 month, 48 for 32 days to 6 months, 38 for an indefinite period of time, and 10 for other stated periods.

Physical examination upon employment. Rejection from employment because of physical defects. Exclusion from membership in sick benefit organizations.—Special efforts were made to obtain information concerning physical examinations given by the employer before or upon hiring an applicant for work. Four hundred and ninety-four, or 68 percent, of the plants give such an examination, 11 percent do not, and 21 percent did not report.

Plants which rejected applicants for employment in 1934 because of their physical conditions numbered 175, or 24 percent, of all plants. Two hundred and thirty-five, or 32 percent, reported no rejections; 44 percent made no report; and 31 plants reported a very small percentage, or practically none, rejected. Seventeen reported 1 percent rejections, 38 reported 1.1 to 5.0 percent, and 72 reported 5.1 to 10.0 percent. Three plants reported over 25 percent rejections. Of the

plants operating mutual benefit associations, 34 percent reported rejections of applicants. Of the plants with group insurance, only 15 percent reported rejections.

A total of 365, or 50 percent, of the plants excluded no applicants for membership in 1934. Thirty-two percent made no report. One hundred and twenty-nine, or 18 percent, excluded applicants. Of the plants having mutual benefit associations, 100, or 33 percent, excluded applicants; of those operating under group insurance plans, only 9 excluded applicants in 1934.

PAYMENT OF SICK BENEFITS

The rules and regulations governing sick benefits have a distinct bearing upon the morbidity rates which are based upon records of sick benefit organizations. As a rule, the data recorded by these organizations do not deal with all illnesses which occur among the members nor with the entire periods of their occurrence.

Benefits are paid only for disabling illnesses; hence a disease which does not prevent an employee from performing his duties is not compensable and, as a rule, is not recorded. During the waiting periods no illnesses are recorded. Waiting periods vary with the different organizations. The periods for which sick benefits are paid also vary. Hence, morbidity rates are comparable only for organizations having the same waiting period after the onset of disability and the same length of benefit period. However, the length of the benefit period does not affect the recorded incidence rate; it influences the time lost and severity rates for those illnesses which extend beyond the termination of benefit payments.

Generally, two types of waiting period are in effect: (a) An initial waiting period, that is, the time between admission to membership and eligibility for benefits; and, (b) the waiting period between onset of disability and commencement of payment of benefits.

Initial waiting period.—Of the total of 731 plants, 455, or 62 percent, have no initial waiting period. These plants had a total of 367,260 members, 59 percent of the total "known" members. One hundred and fifty, or 21 percent, of all plants, covering 20 percent of all members, have a waiting period of 15 days to 1 month.

Of the plants with mutual benefit associations, 145, or 47 percent, have no initial waiting period; 108, or 35 percent, have a waiting period of 15 days to 1 month; 34, or 11 percent, have one of over 1 month to 3 months. Of the plants operating under group insurance, 292, or 91 percent, have no waiting period.

Waiting period after onset of disability.—Only 7 of the plants, having 5,440 members, have no waiting period after the onset of disability. Four hundred and forty-one, or 60 percent, have a 7-day waiting

period; 82, or 11 percent, have a 7-day waiting period with payments of benefits retroactive to a specified date.

Of the plants with mutual benefit associations, 137, or 45 percent, have a 7-day waiting period; 75, or 25 percent, have a 7-day retroactive waiting period. Two hundred and seventy-seven, or 87 percent, of the plants with group insurance have a 7-day waiting period.

Classes of membership.—A total of 102, or 14 percent, of the plants have no formal classes of membership. In this group are included the 15 plants which pay a percentage of wages during illness. Also included in this group are 60 plants which pay a definite amount of benefits for each specified wage unit within a set lower and upper limit. Other plants in this group make length of employment exclusively, or in addition to amount of wages, the basis of the amounts of their benefits.

A total of 274, or 37 percent, of the plants have definite classes of membership ranging in number from 2 to 9 or more, based usually upon any or all of the following conditions: Earnings, length of service, type of position, and sex.

Dues or premiums paid by members.—Minimum dues range from \$0.10 to \$4 per month, maximum dues from \$0.10 to \$15 per month. Not quite one-third of the plants with mutual benefit associations (93, or 30 percent) impose upon their members maximum dues ranging from \$0.50 to \$0.69 per month; the minimum amounts for this group range from \$0.10 to \$0.69. Fifty-seven, or 19 percent, of the plants ask for dues of \$1 to \$1.49 per month as a maximum; the minimum amounts for this group extend from \$0.10 to \$1.49. Together these two groups of plants account for about one-half of all plants with mutual sick benefit associations.

Of the plants having group insurance plans, 212, or 66 percent, pay maximum monthly dues of \$1 or more. The minimum dues begin with \$0.10 and extend to \$4 per month; the maximum in this group extends to \$10.70.

Benefit period per case and maximum period per year.—The benefit period per case ranges from 3 weeks to 104 weeks. A total of 81 plants state that their benefit period per case is "continuous," without specifying whether or not this term applies to the calendar year, namely, 52 weeks.

Thirty-six, or 5 percent, of the plants have different benefit periods for different classes of membership. A total of 190, or 26 percent, of the plants pay benefits for 13 weeks with a limit of 6 weeks for cases of pregnancy; 187, or 98 percent, of this group of plants operate under group insurance plans. These 187 plants constitute 58 percent of all plants with group insurance plans. Another 21 percent of the plants with group insurance have also a 13-week benefit period with no special arrangement for cases of pregnancy. One hundred and twenty-

three, or 17 percent, of all plants have a benefit period of 13 weeks' duration; 55 percent of these have group insurance plans. A total of 116, or 16 percent, have a benefit period of 26 weeks' duration; 73, or 63 percent, of this group operate mutual benefit associations.

The maximum benefit period per year ranges from 3 to 52 weeks. Four hundred and thirty-one, or 59 percent, of all plants pay benefits for a maximum period of 52 weeks; 278, or 65 percent, of the plants in this group operate under group insurance. One hundred and nine, or 36 percent, of the plants with mutual benefit associations and 278, or 87 percent, of the plants having group insurance have a maximum benefit period per year of 52 weeks.

Resumption of payment of sick benefits for new cases of illness and for chronic cases.—The rules regarding the resumption of payments of sick benefits within a calendar period are closely related to the rules concerning benefit periods in general. A sick benefit organization which permits resumption of benefit payments extends in fact the benefit period, especially since in a number of cases only a very brief intervening period of work is required. Most organizations distinguish between new cases and chronic cases of illness in their resumption of payments.

Of the 504 plants which made reports on the subject, 240, or 48 percent, practice no resumption of payments for chronic cases; 213, or 42 percent, do so with or without requiring the member to satisfy certain conditions.

A total of 190 of the 306 plants with mutual benefit associations answered the question concerning resumption of payment for chronic cases. Sixty-six, or 35 percent, of this group do not resume payment of benefits for chronic cases; 124, or 65 percent, do so. Of the 320 plants covered by group insurance, 226 replied to this inquiry. Of these, 155, or 69 percent, do not resume benefit payments for chronic cases; 71, or 31 percent, do resume payments.

A total of 364, or 65 percent, of the plants which reported on the resumption of benefit payments for new cases of illness answered this question in the affirmative and 143, or 26 percent, in the negative. Of the 222 reporting plants with mutual sick benefit associations, 166, or 75 percent, resume benefit payments on new cases of illness; 56, or 25 percent, do not. Of 236 reporting plants covered by group insurance, 168, or 71 percent, resume payment; 68, or 29 percent, do not.

Extension of benefit period.—The extension of the period for which benefits are paid beyond the maximum fixed by rules and regulations is often left to the discretion of the administrative organ of the benefit organization. Only 111, or 15 percent, of all plants make provision for an extension of the benefit period.

*Sick benefits.*¹⁴—The minimum benefit ranges from \$0.50 to \$40.49 per week; the maximum benefit ranges from \$0.50 to \$90.49 per week. A total of 414, or 57 percent, of all plants pay a maximum benefit per week of \$14.50 or more. One hundred and sixty-four, or 54 percent, of the plants with mutual sick benefit associations pay maximum benefits ranging from \$4.50 to \$14.49 per week; 43 percent pay maximum benefits ranging from \$14.50 to \$40.49 per week. Of the plants covered by group insurance 133, or 42 percent, pay a maximum benefit ranging from \$9.50 to \$19.49; 54 percent pay a maximum ranging from \$19.50 to \$40.49. Only 2 percent of the plants with group insurance pay a maximum benefit of \$4.50 to \$9.49, while 21 percent of the plants with mutual benefit associations pay these amounts.

Payment of sick benefits for fraction of week.—The size of sick benefits is also slightly influenced by rules which determine whether benefits are to be paid for full weeks only or for fractions of a week. A total of 638, or 87 percent, of the plants pay benefits for a fraction of a week, 17 plants do so only after the first full week, 3 plants pay for fractions of a week under certain conditions, and 15 plants pay for full weeks only.

Payment of wages during disability.—A total of 234, or 32 percent, of the plants do not continue the payment of wages during disablement of an employee. Three hundred and seventy-one, or 51 percent, of the plants pay wages under certain conditions. Two hundred and twenty of these plants do so in special cases, in 63 of these plants salaried employees are kept on the pay roll, and in another 63 of these plants both salaried employees and foremen continue on the pay roll during illness. Some of the plants listed as "all others" pay wages instead of sick benefits during the illness of an employee.

Reporting of disabling illnesses.—In order to draw benefits a disabled member must report his condition to the sick benefit organization. A total of 151, or 21 percent, of the plants require that their members make such reports within 24 hours of the onset of a disability, 52 plants allow 48 hours in which to make such reports, and 42 allow 3 days. One hundred and four plants grant a time limit of 1 week; 159 allow an incapacitating illness to remain unreported up to 2 weeks. Fifty-five plants exceed the time limit of 2 weeks, one plant allowing reports to come in later than 3 months after the onset of a disease.

Practically all plants require that a disabled member be examined by a physician and that the latter's certificate be submitted to them. A somewhat smaller percentage of plants demand that the physician also report his diagnosis.

¹⁴ The term "sick benefit" as used in this paper denotes cash benefit. Organizations which pay no cash benefits but provide medical care or sick leave with pay are classified as "all other organizations", the benefits of which were not studied in detail. Furthermore, this paper does not deal with any phase of medical care provided by the employers, the sick benefit organizations, or the insurance companies.

Refusal of benefits.—A number of plants refuse the payment of sick benefits for disabilities created by the following causes: Improper use of stimulants or narcotics, immoral practices, voluntary self-injury, fighting, unlawful acts, venereal diseases, maternity, and a number of other causes. One hundred and twenty-one plants refuse benefits for all of the following causes: Improper use of stimulants or narcotics, immoral practices, self-injury, fighting, venereal diseases, unlawful acts. Forty-five plants list maternity in addition to the foregoing causes. Self-injury is the only cause excluded by 92 plants, fighting the only cause excluded by 74 plants.

Supervision of disabled members.—A total of 710 of the plants reported their methods in the control of "malingering," some using more than one method. Two hundred and ninety-one of the plants appoint a visiting committee to call upon the disabled member and report on his condition. In 203 plants this duty is delegated to the association physician, and in 132 plants to the association nurse. In 72 plants the company physician is responsible for the supervision of the disabled members.

SUMMARY

An occupational morbidity and mortality study (part of the National Health Survey) was begun in 1935, following a grant from the Works Progress Administration. Material obtained in connection with this study is presented on 381 sick benefit organizations covering 731 industrial plants. A brief historical introduction relating to the development of different types of sick benefit organizations is presented, and reference is made, among other things, to the dates of establishment of the organizations, together with their geographic and industrial distribution, membership and service requirements, waiting periods, classes of membership, dues, benefit periods, sick benefits, reporting of disabling illnesses, and refusal of benefits.

TREATMENT OF PSORIASIS WITH MASSIVE DOSES OF CRYSTALLINE VITAMIN D AND IRRADIATED ERGOSTEROL

A Preliminary Report ¹

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Psoriasis has been recognized for many years as one of the most frequent disorders of the skin. Lane and Crawford found it to constitute about 6 percent of all skin diseases seen in a dermatological

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² We wish to express our appreciation to Dr. Harry Robinson, of the University of Maryland, and Dr. W. H. Sebrell, of the U. S. Public Health Service, for their cooperation in this study.

clinic (1). Numerous concepts regarding its infectious, metabolic, or neurogenic nature have been offered; and, consequently, a tremendous variety of therapeutic agents have been employed. Only a few have been found to afford any benefit to the majority of the patients afflicted with this chronic and obstinate dermatopathy.

One fact that is popularly known, however, is that sufficient ultraviolet irradiation promotes involution of the psoriatic process in many instances. This is substantiated by the fact that the condition is less prevalent in the tropics, worse in winter than in summer, and that therapeutic irradiation has been successfully used by dermatologists in their practice (2, 3).

Goeckermann (4) has outlined a treatment consisting of ultraviolet irradiation of crude coal tar applied to the lesions, and he and numerous other workers have found this to be a consistent remedy in controlling attacks. He found that the irradiation of crude coal tar was more effective than the use of either agent alone.

Herrick and Sheard (5), in attempting to learn what pharmacological mechanism was involved, performed photo-chemical studies on the ultraviolet irradiation of crude coal tar. It was suggested by these workers that a new chemical was formed which exerted a beneficial effect. By spectroscopic examination, it was recognized that a new substance had been produced which could not be definitely identified. In the past decade, viosterol, a common irradiated ergosterol product, has been employed in small doses without signal success. Krafka (6), however, recently reported benefit following larger doses of viosterol in 3 cases of psoriasis.

Only in recent years have more potent irradiated ergosterol products been available and been found to be apparently therapeutically safe (7, 8, 9, 10, 11, 12). Massive doses which were previously considered hazardous have been administered to a large number of patients afflicted with arthritis and numerous other conditions without any apparent ill effect. Bills, in his review article (13), states that the unfortunate experience with certain irradiated ergosterol products in the past was found to be due to the presence of a toxic substance (toxisterol) which has since been eliminated in modern commercial products. Furthermore, reports in the literature show that the deleterious effect of massive doses of irradiated ergosterol have occurred in children and experimentally in rats (14). The fact has been revealed, however, that subjects of both these classes are much more sensitive to the substance than adults, either of the animal or human species (15).

While employing massive doses of vitamin D, averaging 300,000 units daily, in the treatment of a series of cases afflicted with chronic arthritis, a complete involution of a wide-spread chronic psoriatic process occurred in an individual afflicted with both conditions. This

suggested further application, and since April 1936 we have applied this treatment in 15 cases of chronic wide-spread psoriasis; in 3 of the patients the process was universally distributed over the entire body.

Individual case reports will be omitted here for the sake of brevity, but all patients were between the ages of 30 and 50. Two of the 15 were female, and the remaining 13 were males. In all cases the psoriasis had existed for several years, in some as long as 20 years, and was resistant to numerous remedies and without conspicuous spontaneous involution. No local treatment of the lesions or any other measure was employed while the patient was receiving this mode of treatment, nor did the patients receive any dietary treatment. Those who were being treated during the summer months were protected from natural sunlight radiation as much as possible. Each patient received 300,000 to 400,000 units of irradiated ergosterol (vitamin D) by mouth daily. In the first 12 subjects the product used was that manufactured by the Winthrop Chemical Co., prepared in capsules reported to contain 50,000 units of pure crystalline vitamin D in 5 minims of sesame oil. This will be designated as "Product A" throughout the paper. In the last 3 cases of the series, irradiated ergosterol standardized to the same potency and prepared in the same manner by the Mead Johnson Co.³ (and hereafter designated as "Product B"), was administered.

In the first group, treated with Product A, 10 of the 12 cases showed a complete involution within 6 to 12 weeks' time. In the second group of 3, treated by Product B, only 1 of the 3 showed a complete involution, while the remaining 2 obtained only partial improvement within 10 weeks of observation. The capsules were taken between meals to avoid any augmented action that might occur with milk products, as suggested by Lewis (16). There were no untoward reactions during the course of treatment of these particular subjects, with the exception of three individuals who developed the suggested evidence of hyper-vitaminosis D, characterized by anorexia, nausea, malaise, and urinary frequency, after 10 to 12 weeks of treatment. However, they had obtained their benefit by that time, and treatment was about to be discontinued. These reactions were mild and caused no alarm or disability.

All subjects were examined carefully before treatment was begun. Roentgenograms of the chests were made of all subjects, and only those who were free from significant healed calcified tuberculosis were treated, in order to avoid mobilization of this important calcified process; although Spies (17) suggests that large doses of irradiated ergosterol promote the calcification of tubercles rather than the contrary. After institution of treatment, blood calcium determina-

³This product was very kindly supplied by the Wisconsin Alumni Research Foundation.

tions and urinalyses were performed at weekly intervals. All patients but one slowly and progressively developed a hypercalcemia. The maximum range varied from 12 to 16 mg percent.

In the first group, treated by Product A, 10 of whom received marked benefit from the treatment, 6 patients experienced the return of the psoriasis within from 6 weeks to 5 months after discontinuance of treatment. The recurrence was gradual; in most instances, it did not return to the same degree of severity as existed prior to the course of treatment. There was no recurrence in the 4 remaining patients, who have been observed for periods ranging from 3 to 8 months.

Only one of the group of those who had a recurrence has been subjected to a repeated course of treatment. He has experienced 2 such attacks after an approximate interval of freedom of 2 to 3 months, but the process was limited to the scalp on the first and second recurrence. He obtained equally good results by a repeated course of treatment of 8 to 10 weeks' duration on each occasion. The one subject who enjoyed complete involution when treated by Product B was treated too recently to have developed a recurrence and to evaluate in this fashion.

We do not know as yet what constitutes a minimal therapeutic dose. In this original series all patients received at least 300,000 units daily, as we wished to be certain that an adequate quantity was being given. After involution has been produced, a small maintenance dose may be necessary. There are various methods of preparing irradiated ergosterol concentrates, and at least 6 components have been identified as being produced by irradiation of ergosterol (18). It may be possible that the effective antipsoriatic element is lacking or present in minimal quantity in some products, dependent upon their mode of preparation. This, of course, is a conjecture on our part; but until various products have been employed, we feel that reservation as to their efficacy in psoriasis is indicated.

SUMMARY

A preliminary report is given of a series of 15 cases of chronic, widespread psoriasis which were treated by 300,000 to 400,000 units of vitamin D from irradiated ergosterol daily; 12 were treated by one product and 3 by another. Eleven subjects obtained a complete involution in a maximum of 12 weeks, while 2 obtained only partial benefit and 2 showed no benefit. Massive doses of the preparations used appear to be relatively safe when administered to adults. This study so far suggests that this is a practical, simple, and effective treatment for the control of psoriasis.

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PULMONARY TUMORS IN MICE

IV. Lung Tumors Induced by Subcutaneous Injection of 1:2:5:6-Dibenzanthracene in Different Media and by its Direct Contact with Lung Tissues

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In previous publications (1, 2) it was shown that the lungs of strain A mice and their offspring are especially susceptible to the carcinogenic action of 1:2:5:6-dibenzanthracene when a lard solution of the compound is administered subcutaneously. It has also been shown (3) that subcutaneous or intravenous injection of a dog-serum or horse-serum dispersion of the hydrocarbon induces pulmonary tumors in mice. During the course of these latter experiments it was noted that the lungs of mice receiving the serum injections subcutaneously contained more growths than those given an equal amount of the carcinogenic agent as a lard solution. This observation led to an experiment in which strain A mice were given equal quantities of the hydrocarbon in four different media in order to determine what influence the procedure might exert upon the subsequent appearance of pulmonary growths.

EXPERIMENT 1

One hundred and thirty female strain A mice, all of which were 3 months of age, were used in this experiment. They were divided into 5 groups and given the compound as described below. All injections were given subcutaneously in the right axillary region.

Group A.—Twenty mice each received a cholesterol pellet containing 5 percent of 1:2:5:6-dibenzanthracene, prepared according to the technique described by Shear (7). Each pellet weighed from 20 to 30 mg; hence, each contained from 1 to 1.5 mg of the hydrocarbon.

Group B.—Thirty mice were each given 0.25 cc of a lard solution containing 1 mg of the hydrocarbon.

Group C.—Thirty mice each received 0.25 cc of a 50 percent solution of glycerine in water in which was suspended 1 mg of crystalline 1:2:5:6-dibenzanthracene.

Group D.—Twenty mice each received 1 cc of a horse-serum dispersion containing 1 mg of the compound. The dispersion was prepared in these laboratories by Doctor Lorenz.

Group E.—Thirty mice were set aside as untreated controls.

The injections were given on August 14, 1936. Between that time and September 24, 1936, 7 mice of group B and 10 mice of group C were used for other experimental purposes; none had lung growths. On October 15, 1936, 2 more mice of both group B and group C were killed for other purposes and all 4 had several small nodules within their lungs.

On November 7, 1936, 5 mice of each of the 4 experimental groups were killed and autopsied, and 1 week later (3 months after the time of injection) all surviving mice were killed and their lungs examined for the presence of macroscopic tumor growth. The results of the experiment are presented in table 1.

TABLE 1.—*Experiment 1: Pulmonary growths induced in strain A mice by the subcutaneous injection of 1 mg of 1:2:5:6-dibenzanthracene in various media*

Group	Preparation used	Number of mice used	Used experimentally from Aug. 14, 1936, to Nov. 7, 1936	Killed Nov. 7-14, 1936			
				Number killed	Results		Average number of nodules counted in positive lungs
					Negative	Positive	
A.....	Cholesterol pellet.....	20	0	20	7	13	2
B.....	Lard solution.....	30	9	21	2	19	14
C.....	Glycerin-suspension.....	30	12	18	1	17	13
D.....	Serum dispersion.....	20	0	20	0	20	30+
E.....	Untreated controls.....	30	0	30	27	3	1

It is seen that, of the experimental mice, 13, or 65 percent, of group A, 19, or 90 percent, of group B, 17, or 94 percent, of group C, and all of group D had induced pulmonary tumors, while of the controls 3, or 10 percent, had spontaneous pulmonary growths. While examining the lungs it was noted that the mice of group C had many more nodules within their lungs than did those of the other 4 groups. In order to demonstrate this quantitative difference, it was necessary to count the number of nodules on the surface of each positive set of lungs and to determine the average number of nodules per mouse by

dividing the total number observed by the number of mice with induced lung tumors. These averages are shown in the last column of table 1. An average of 30 plus was given to group D because the nodules were too numerous to count with certainty. It is clear that the horse-serum dispersion was more effective in invoking lung growths than any of the other preparations.

These results suggest that 1:2:5:6-dibenzanthracene, when injected subcutaneously into susceptible mice, induces more lung tumors when injected as a fine suspension in a medium which is capable of leaving the site of injection. It would appear reasonable to assume that when injected as a dispersion in serum, more of the compound became distributed throughout the body of the animal than when injected as a lard solution or a glycerine suspension. It is obvious that the greater part of the lard remained at the injection site while most of the crystals suspended in glycerine were much larger than those of the serum dispersion. However, both the lard solution and glycerine suspension induced a considerable number of lung growths. The reason for the appearance of approximately the same number of lung tumors in mice receiving these last two preparations is not clear. Some of the lard solution probably left the site of injection and reached the lungs by means of the blood stream. In the same manner some of the crystals injected in glycerine might have been dissolved in the body fluids and carried to the lungs, or small crystals might have been carried to the lungs as such. It is known that small crystals of the compound were in the lard solution; for in this laboratory Lorenz has found that, when a solution of 1:2:5:6-dibenzanthracene in lard containing 4 mg of the compound in each cc of lard is examined microscopically or even macroscopically in fluorescent light, many small dibenzanthracene crystals are present, the size depending upon the rate of cooling of the heated solution.

It is essential to note that in the case of those mice receiving pellets, their tissues came into contact only with the amount of hydrocarbon present upon the surface of the pellet. Therefore, the results obtained with the mice of group A may be regarded as showing that the presence alone of 1:2:5:6-dibenzanthracene within the body was not sufficient to induce many lung growths within the limits of this experiment. The results of experiment 1 suggest that lung tumors might be induced by the carcinogenic agent acting directly upon the lung tissue.

In the experiment just described, 3 months elapsed between the time of injection and the time the mice were autopsied. Previous investigations (1) had also shown that a period of 3 months is sufficient to induce lung nodules in practically every strain A mouse injected subcutaneously with 0.8 mg of 1:2:5:6-dibenzanthracene as a lard solution. This period is considerably less than the latent period between subcutaneous injection of strain A mice with larger amounts of the agent and the appearance of tumors at the site of injection. If the

lung tumors were produced by a direct action of the agent upon lung tissue, it should be possible to induce them in strain A mice within 3 months after the introduction of 1:2:5:6-dibenzanthracene directly into their lungs.

With this end in view, a method was devised for inserting the compound into the lungs. Silk threads about 150 mm in length were dipped into molten 1:2:5:6-dibenzanthracene so that one end was covered for a distance of about 5 mm, which provided a coating of the solid compound containing approximately 1 mg on each thread. They were then threaded into a fine needle and sterilized by boiling. Mice were anesthetized by an intraperitoneal injection of nembutal and the needle was passed through the chest cavity by inserting it through the front of the chest wall between the ribs, so as to miss the heart, and extruded through the rear of the chest wall close to the vertebral column. The thread was then drawn through the mouse until the coated end had disappeared from view into the pleural cavity and the end protruding from the mouse's back cut as close to the skin as possible. This procedure was found to be satisfactory in placing the coated thread within the lungs of about 60 percent of the experimental animals.

EXPERIMENT 2

On November 10, 1936, threads coated with the hydrocarbon were inserted through the chest cavity of 22 strain A, 7 strain C₃H and 6 strain C57 black mice. All the animals were approximately 2½ months old. Strain C₃H mice were used because earlier investigations (3) had shown their lungs to be susceptible to induced growths and the C57 blacks were employed because of their resistance to all types of spontaneous growths. The mice were sacrificed at different intervals during the course of the experiment and their lungs examined for the presence of the coated thread. If the thread had pierced the lungs the area surrounding the thread was fixed and prepared for histological examination. In the interest of clarity and brevity, the results of this experiment are presented in table 2.

TABLE 2.—*Experiment 2: Results obtained by inserting thread coated with 1 mg of 1:2:5:6-dibenzanthracene directly into lungs of mice*

Strain of mice	Number killed	Date killed	Time in weeks after insertion of thread	Number in which thread had missed lungs	Results of histological findings in lungs pierced by coated thread			
					Reaction tissue only	Adenoma	Adeno-carcinoma	Squamous cell carcinoma
A.....	2	Jan. 22, 1937	10	-----	1	1	-----	-----
A.....	9	Jan. 28, 1937	11	1	2	4	1	1
C ₃ H.....	7	do.	11	4	1	1	-----	1
A.....	11	Feb. 17, 1937	14	7	-----	1	-----	3
C57 black.....	6	Feb. 23, 1937	15	2	2	1	1	-----

It is seen that 1:2:5:6-dibenzanthracene induced tumor growth in the lungs of all three strains of mice and that the growths appeared in both strain A and strain C₃H mice within 3 months after the agent had been placed in their lungs (figs. 1 and 2).

The production of tumors within the lungs of strain C57 black mice is of interest, for these mice are known to be resistant to the development of spontaneous tumors, and in this laboratory their lungs have thus far proved to be very resistant to tumors induced by the subcutaneous injection of lard-dibenzanthracene solutions. Hence the results obtained in experiment 2 with this strain of mice suggest that tumors can be induced in the lungs of various strains of mice regardless of their genetic constitution, and that the variation in susceptibility of different strains of mice to induced lung tumors is a matter of degree. It is known (4) that the subcutaneous tissues of different inbred strains of mice are susceptible to the carcinogenic power of dibenzanthracene, and in all probability the same is true for their lung tissue.

The fact that all inbred strains of mice are responsive to the carcinogenic activity of relatively large amounts of 1:2:5:6-dibenzanthracene does not lessen the importance of recognizing the part played by their genetic constitutions in the appearance of spontaneous tumors. Indeed, the pronounced variation in susceptibility to lard solutions of 1:2:5:6-dibenzanthracene shown by different strains of mice (6) is further evidence of differences in their susceptibility to tumor growth.

Histological studies of the induced lung growths revealed that the compound induced a variety of malignant changes within the tissues of the lung (fig. 3). Adenomatous growths were the most common; but adenocarcinomas and squamous-cell carcinomas were also observed, while in most of the sections studied, two or all three of these types of growth were seen. Furthermore, among the carcinomatous elements in some lungs were found areas of hypertrophied connective tissue cells containing large nuclei and nucleoli and strongly resembling sarcoma. The predominating types of growth observed in the sections studied are listed in table 2.

An area of tumor growth surrounding a thread in one strain A mouse has undergone six serial passages in the subcutaneous tissues of mice of the same strain (lung tumor J). Histological preparations of the primary induced growth contained an area of squamous-cell carcinoma with keratin formation and several adenomas (fig. 4). Sections of the first passage of this tumor consist mostly of squamous cells with a stroma formation suggesting sarcoma. The second passage tumor is a mixed tumor (fig. 5) for both squamous cells with keratin formation and sarcomatous tissues are seen, while section of the third passage consists mostly of sarcoma cells. The tumor has

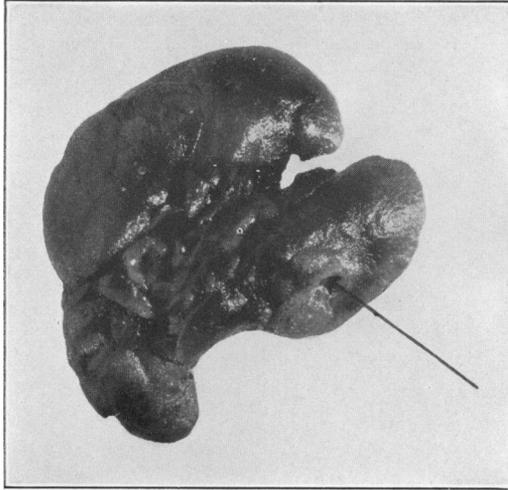


FIGURE 1.—A lung tumor induced in a strain A mouse within 11 weeks after insertion of a thread coated with solid 1:2:5:6-dibenzanthracene. The arrow points to the thread which is surrounded by the growth.

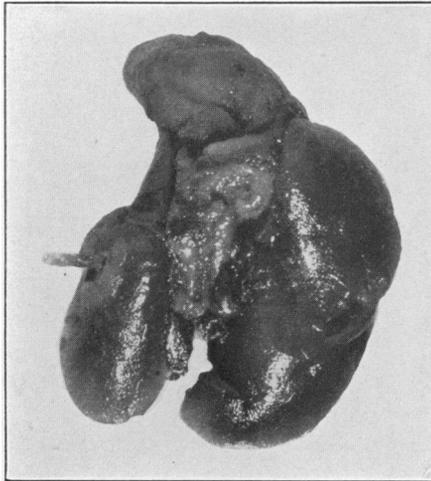


FIGURE 2.—Another view of the same lungs as in figure 1, showing the thread extruding from the induced tumor.

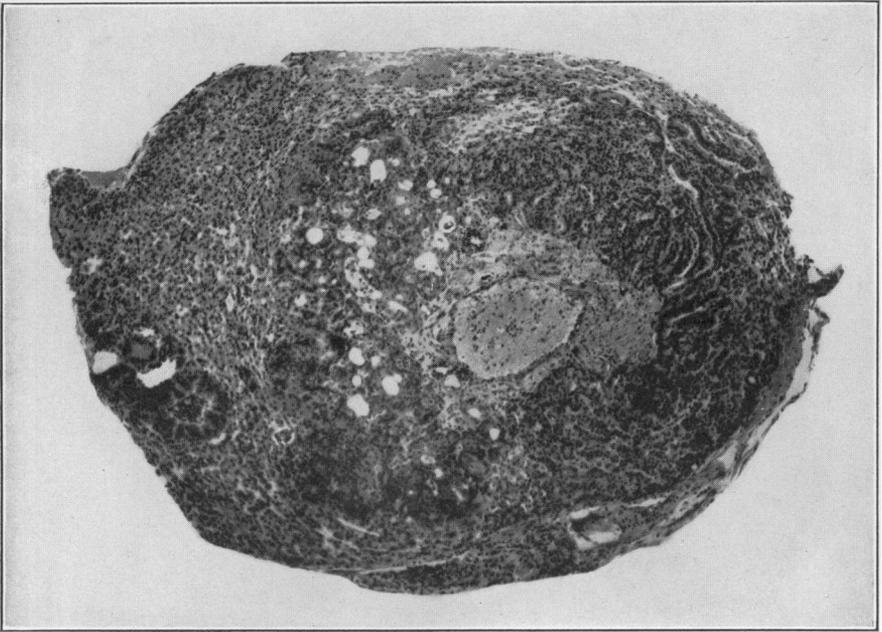


FIGURE 3.—Showing lung area around a thread in a C57 black mouse. The thread had been withdrawn before the tissue was fixed. The space occupied by the thread is seen surrounded by reaction tissue and tumor tissue. ($\times 75$.)

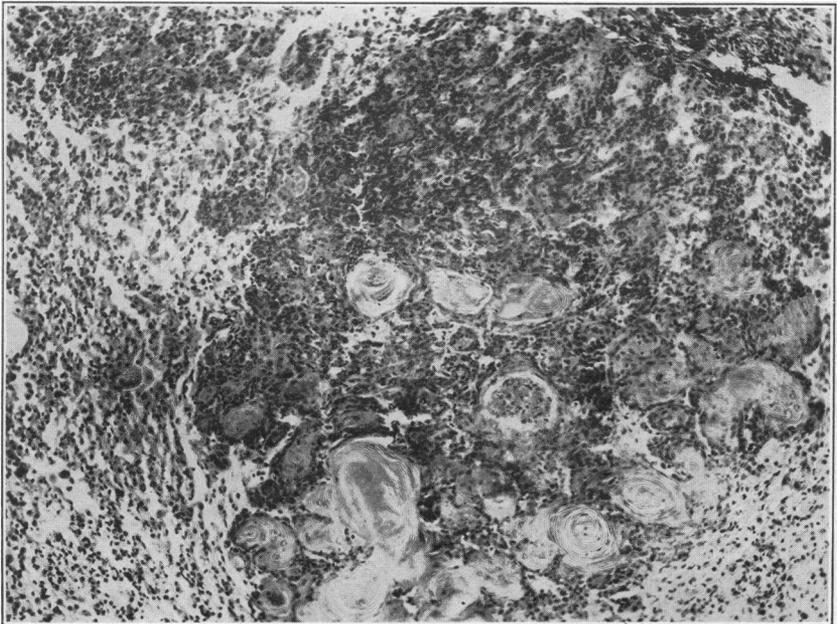


FIGURE 4.—Lung tumor J, showing the primary induced squamous-cell carcinoma. ($\times 200$.)

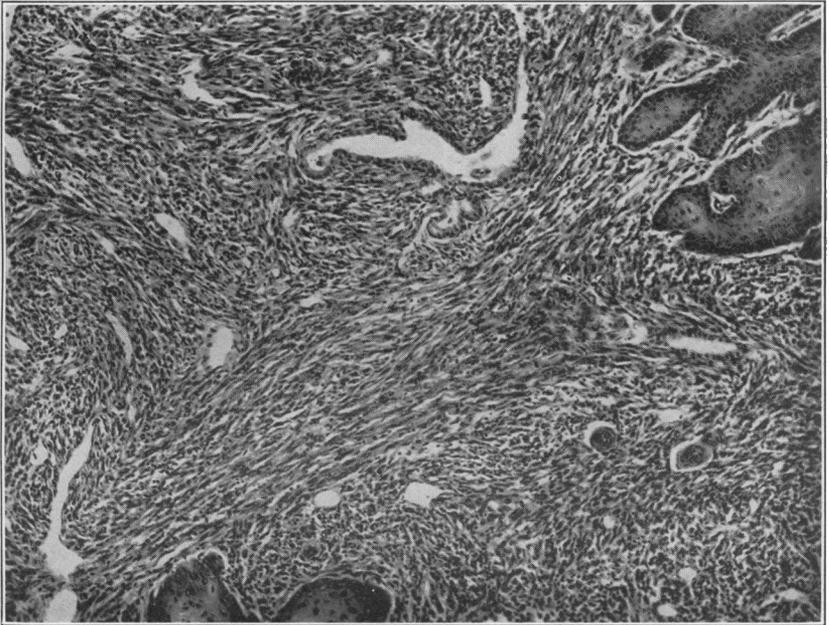


FIGURE 5.—Lung tumor J, second passage, showing mixed tumor consisting of sarcomatous tissue and squamous cells. ($\times 200$.)

continued to grow as a sarcoma in all subsequent passages. This sequence of events is similar to that observed previously (6) during the serial transplantation of other induced lung tumors in strain A mice.

SUMMARY

When 1:2:5:6-dibenzanthracene was injected subcutaneously into strain A mice in different media, namely, a dispersion in horse serum, a solution in lard, a suspension in glycerine, and a solid solution in cholesterol, it was found that the horse-serum dispersion induced the most pulmonary growths.

Lung tumors were induced in mice of strain A, strain C₃H, and strain C57 black by inserting 1:2:5:6-dibenzanthracene directly into their lungs.

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DEATHS DURING WEEK ENDED OCT. 16, 1937

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 16, 1937	Corresponding week, 1936
Data from 86 large cities in the United States:		
Total deaths.....	7,844	7,798
Average for 3 prior years.....	7,599	-----
Total deaths, first 41 weeks of year.....	354,506	354,217
Deaths under 1 year of age.....	525	556
Average for 3 prior years.....	543	-----
Deaths under 1 year of age, first 41 weeks of year.....	22,825	22,863
Data from industrial insurance companies:		
Policies in force.....	69,971,510	68,617,638
Number of death claims.....	9,942	9,933
Death claims per 1,000 policies in force, annual rate.....	7.4	7.6
Death claims per 1,000 policies, first 41 weeks of year, annual rate.....	9.8	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables a zero (0) is to be interpreted to mean that no cases or deaths occurred, while leaders (.....) indicate that cases or deaths may have occurred although none was reported.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Oct. 23, 1937, and Oct. 24, 1936

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936
New England States:								
Maine.....	3	6	3	.....	18	14	0	0
New Hampshire.....	.....	1	.....	.....	4	.....	0	1
Vermont.....	2	.....	.....	.....	3	.....	0	0
Massachusetts.....	.....	3	.....	.....	18	47	1	4
Rhode Island.....	.....	.....	.....	.....	.....	96	0	0
Connecticut.....	9	2	2	.....	5	8	0	0
Middle Atlantic States:								
New York.....	26	14	12	17	91	52	10	7
New Jersey.....	11	20	5	7	57	41	0	2
Pennsylvania.....	27	23	.....	.....	436	29	1	6
East North Central States:								
Ohio.....	39	34	4	8	163	5	9	5
Indiana.....	25	35	14	10	5	2	0	3
Illinois.....	38	32	11	6	127	17	3	3
Michigan.....	24	22	.....	2	39	20	1	2
Wisconsin.....	10	3	33	16	19	19	0	1
West North Central States:								
Minnesota.....	19	6	.....	.....	6	8	0	1
Iowa.....	2	4	.....	.....	3	5	0	0
Missouri.....	41	11	27	130	107	.....	2	0
North Dakota.....	2	.....	.....	9	.....	.....	1	0
South Dakota.....	.....	.....	.....	.....	.....	1	0	0
Nebraska.....	6	2	.....	.....	1	2	1	1
Kansas.....	5	14	3	.....	4	1	0	0
South Atlantic States:								
Delaware.....	4	5	.....	8	.....	9	0	0
Maryland.....	7	15	13	4	3	6	3	0
District of Columbia.....	7	7	2	2	3	8	3	1
Virginia.....	77	67	.....	.....	29	4	0	4
West Virginia.....	47	42	8	11	26	1	2	1
North Carolina.....	122	180	3	10	80	13	2	0
South Carolina.....	15	14	140	114	26	9	1	0
Georgia.....	25	32	.....	.....	.....	.....	0	0
Florida.....	20	20	2	4	2	2	1	0
East South Central States:								
Kentucky.....	32	41	9	12	60	93	7	4
Tennessee.....	67	68	27	38	8	2	3	0
Alabama.....	30	34	17	20	6	.....	2	2
Mississippi.....	17	17	.....	.....	.....	.....	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Oct. 23, 1937, and Oct. 24, 1936—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936
West South Central States:								
Arkansas.....	28	7	13	6	6	-----	0	0
Louisiana ³	7	29	9	23	-----	1	0	1
Oklahoma ⁴	17	16	21	40	2	1	1	3
Texas ⁵	36	27	123	92	22	4	2	0
Mountain States:								
Montana.....	-----	1	-----	12	2	2	0	0
Idaho.....	1	-----	1	8	19	45	0	1
Wyoming.....	-----	1	-----	-----	-----	-----	0	0
Colorado.....	10	10	-----	-----	29	2	3	2
New Mexico.....	3	5	1	-----	30	35	1	0
Arizona.....	6	8	40	22	1	11	0	0
Utah ²	-----	-----	-----	-----	63	8	1	1
Pacific States:								
Washington.....	1	-----	-----	-----	6	5	2	1
Oregon.....	-----	3	15	26	4	6	0	1
California.....	42	45	22	30	33	46	3	2
Total.....	908	926	580	672	1,566	680	67	60
First 42 weeks of year.....	19,559	20,247	278,638	143,607	249,260	270,770	4,672	6,406

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fevers	
	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936
New England States:								
Maine.....	3	0	12	10	0	0	2	2
New Hampshire.....	1	0	2	-----	0	0	2	0
Vermont.....	0	0	5	3	0	0	1	1
Massachusetts.....	6	4	106	92	0	0	3	1
Rhode Island.....	0	0	23	17	0	0	1	1
Connecticut.....	4	2	31	34	0	0	2	6
Middle Atlantic States:								
New York.....	29	10	215	237	0	0	18	21
New Jersey.....	5	1	51	37	0	0	3	4
Pennsylvania.....	6	4	230	233	0	0	37	20
East North Central States:								
Ohio.....	2	24	186	139	1	0	17	18
Indiana.....	0	2	120	94	2	0	8	11
Illinois.....	10	45	194	192	0	2	11	27
Michigan.....	12	15	267	154	0	0	1	14
Wisconsin.....	13	0	76	150	0	0	4	6
West North Central States:								
Minnesota.....	20	1	78	78	3	3	0	1
Iowa.....	11	4	76	52	7	2	7	6
Missouri.....	10	3	163	67	7	0	0	19
North Dakota.....	2	1	14	16	5	1	1	0
South Dakota.....	2	0	10	43	0	2	1	0
Nebraska.....	14	2	13	25	0	2	1	0
Kansas.....	6	8	107	71	0	0	0	5
South Atlantic States:								
Delaware.....	0	0	6	4	0	0	0	5
Maryland ^{2,3}	1	1	44	52	0	0	8	17
District of Columbia.....	1	0	5	11	0	0	3	3
Virginia.....	1	1	42	41	0	0	4	25
West Virginia.....	1	7	72	76	1	0	10	17
North Carolina ³	3	2	68	91	0	1	10	10
South Carolina ³	2	2	14	14	0	0	5	13
Georgia ³	0	7	37	31	0	1	7	29
Florida ³	0	1	8	5	0	0	2	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Oct. 23, 1937, and Oct. 24, 1936—Continued

Division and State	Polio-myelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fevers	
	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936	Week ended Oct. 23, 1937	Week ended Oct. 24, 1936
East South Central States:								
Kentucky.....	2	9	85	49	3	0	3	27
Tennessee.....	3	14	55	64	3	0	19	17
Alabama ¹	1	1	12	37	0	0	3	4
Mississippi ²	12	2	10	19	0	0	6	9
West South Central States:								
Arkansas.....	8	4	20	7	0	0	7	5
Louisiana ³	5	0	8	15	0	0	14	15
Oklahoma ⁴	2	2	35	5	1	0	13	13
Texas ¹	12	4	66	22	1	1	46	13
Mountain States:								
Montana.....	0	0	16	140	3	19	1	6
Idaho.....	1	0	32	41	3	2	3	8
Wyoming.....	1	0	10	12	0	1	1	2
Colorado.....	6	0	20	27	1	1	3	0
New Mexico.....	2	1	20	20	0	0	19	32
Arizona.....	0	0	7	15	0	0	5	0
Utah ²	0	0	25	12	0	0	2	0
Pacific States:								
Washington.....	3	3	21	34	30	0	3	3
Oregon.....	2	2	10	25	4	0	3	4
California.....	17	8	169	153	15	0	10	12
Total.....	242	197	2,896	2,756	90	38	330	455
First 42 weeks of year.....	8, 675	3, 534	180, 486	192, 662	8, 546	6, 262	12, 966	12, 204

¹ New York City only.

² Week ended earlier than Saturday.

³ Typhus fever, week ended Oct. 23, 1937, 58 cases, as follows: Maryland, 1; North Carolina, 2; South Carolina, 1; Georgia, 26; Florida, 2; Alabama, 11; Louisiana, 2; Texas, 13.

⁴ Figures for 1936 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Menin-gococ-cus menin-gitis	Diph-theria	Infu-enza	Mala-ria	Mea-sles	Pel-lagra	Polio-mye-litis	Scarlet fever	Small-pox	Ty-phoid fever
<i>September 1937</i>										
Florida.....	5	55	2	188	29	6	8	6	0	16
Georgia.....	2	127	36	640	4	33	10	86	0	53
Illinois.....	8	106	32	24	178	-----	381	474	2	109
Indiana.....	4	42	45	-----	29	-----	49	149	8	19
Kansas.....	6	17	13	4	54	-----	116	211	1	27
Louisiana.....	3	48	18	167	7	10	29	29	0	99
Maryland.....	7	37	16	3	19	1	35	102	0	67
Massachusetts.....	2	7	-----	3	45	4	142	169	0	19
Michigan.....	7	72	5	39	74	-----	204	494	4	43
Minnesota.....	3	24	1	-----	24	-----	176	112	12	27
Nevada.....	-----	-----	-----	-----	2	-----	1	12	0	0
New York.....	18	46	-----	10	360	-----	290	381	0	108
North Dakota.....	3	3	8	-----	5	-----	4	16	5	5
Ohio.....	10	97	48	3	242	-----	178	548	0	250
Oklahoma.....	3	38	95	322	6	7	82	49	4	63
Rhode Island.....	1	4	-----	-----	7	-----	13	38	0	3
South Dakota.....	3	2	6	-----	5	-----	16	33	5	9
Virginia.....	5	127	96	43	42	12	14	57	1	68

Summary of monthly reports from States—Continued

September 1937		September 1937—Continued		September 1937—Continued	
	Cases		Cases		Cases
Actinomycosis:		Hookworm disease:		Septic sore throat—Cont.	
Michigan.....	3	Florida.....	586	South Dakota.....	1
Anthrax:		Georgia.....	484	Virginia.....	3
Minnesota.....	1	Louisiana.....	92	Tetanus:	
Oklahoma.....	1	Impetigo contagiosa:		Georgia.....	1
North Dakota.....	1	Kansas.....	2	Illinois.....	8
Chicken pox:		Maryland.....	26	Kansas.....	1
Florida.....	2	Lead poisoning:		Louisiana.....	2
Georgia.....	4	Illinois.....	2	Maryland.....	2
Illinois.....	105	Massachusetts.....	1	Massachusetts.....	5
Indiana.....	16	Michigan.....	1	Michigan.....	7
Kansas.....	21	Ohio.....	4	New York.....	1
Louisiana.....	3	Mumps:		Ohio.....	4
Maryland.....	13	Florida.....	25	Oklahoma.....	2
Massachusetts.....	67	Georgia.....	26	Trachoma:	
Michigan.....	146	Illinois.....	115	Illinois.....	49
Minnesota.....	40	Indiana.....	4	Louisiana.....	8
Nevada.....	3	Kansas.....	114	Oklahoma.....	8
New York.....	192	Louisiana.....	3	Virginia.....	1
North Dakota.....	9	Maryland.....	8	Trichinosis:	
Ohio.....	70	Massachusetts.....	160	Massachusetts.....	1
Rhode Island.....	6	Michigan.....	143	Michigan.....	3
South Dakota.....	12	Nevada.....	1	New York.....	88
Virginia.....	13	Ohio.....	39	Ohio.....	1
Conjunctivitis:		Oklahoma.....	4	Tularaemia:	
Georgia.....	15	Rhode Island.....	2	Illinois.....	1
Illinois.....	1	South Dakota.....	7	Minnesota.....	3
Dengue:		Virginia.....	57	Nevada.....	1
Florida.....	2	Ophthalmia neonatorum:		Ohio.....	3
Georgia.....	3	Maryland.....	1	Oklahoma.....	1
Diarrhea:		Massachusetts.....	74	Typhus fever:	
Kansas.....	2	New York ¹	8	Florida.....	22
Maryland.....	64	Ohio.....	58	Georgia.....	122
Ohio (under 2 years; enteritis included).....	56	Virginia.....	2	Louisiana.....	5
Dysentery:		Paratyphoid fever:		New York.....	2
Florida.....	23	Florida.....	2	Oklahoma.....	1
Georgia (amoebic).....	9	Georgia.....	2	Undulant fever:	
Georgia (bacillary).....	13	Illinois.....	9	Florida.....	2
Illinois (amoebic).....	7	Kansas.....	1	Georgia.....	2
Illinois (amoebic car- riers).....	21	Louisiana.....	2	Illinois.....	8
Illinois (bacillary).....	70	Maryland.....	2	Kansas.....	12
Kansas (bacillary).....	3	Massachusetts.....	25	Louisiana.....	8
Louisiana (amoebic).....	14	Michigan.....	10	Maryland.....	9
Louisiana (bacillary).....	2	New York.....	18	Massachusetts.....	3
Maryland (bacillary).....	50	Ohio.....	1	Michigan.....	9
Massachusetts (bacil- lary).....	9	Virginia.....	1	Minnesota.....	10
Michigan (amoebic).....	3	Puerperal septicaemia:		Nevada.....	1
Michigan (bacillary).....	4	Georgia.....	1	New York.....	20
Minnesota (amoebic).....	3	Ohio.....	1	Ohio.....	5
Minnesota (bacillary).....	2	Rabies in animals:		Oklahoma.....	29
New York (amoebic).....	14	Illinois.....	18	Rhode Island.....	3
New York (bacillary).....	144	Indiana.....	41	South Dakota.....	1
Ohio (amoebic).....	1	Louisiana.....	9	Virginia.....	4
Ohio (bacillary).....	4	Massachusetts.....	17	Vincent's infection:	
Oklahoma.....	34	Michigan.....	6	Florida.....	10
Virginia (diarrhea in- cluded).....	255	New York ¹	3	Illinois.....	19
Encephalitis, epidemic or lethargic:		Rhode Island.....	1	Kansas.....	9
Illinois.....	25	Rabies in man:		Maryland.....	7
Kansas.....	13	Florida.....	2	Michigan.....	15
Louisiana.....	1	Rocky Mountain spotted fever:		New York ¹	68
Massachusetts.....	1	Maryland.....	3	Oklahoma.....	4
Minnesota.....	4	Ohio.....	1	Whooping cough:	
New York.....	18	Virginia.....	3	Florida.....	40
North Dakota.....	6	Scabies:		Georgia.....	109
Ohio.....	5	Maryland.....	1	Illinois.....	569
Oklahoma.....	1	Oklahoma.....	2	Indiana.....	156
South Dakota.....	18	Septic sore throat:		Kansas.....	199
German measles:		Georgia.....	38	Louisiana.....	41
Illinois.....	26	Illinois.....	5	Maryland.....	397
Kansas.....	6	Indiana.....	2	Massachusetts.....	585
Maryland.....	4	Kansas.....	3	Michigan.....	1,017
Massachusetts.....	22	Louisiana.....	11	Minnesota.....	231
Michigan.....	39	Maryland.....	6	Nevada.....	8
New York.....	49	Massachusetts.....	6	New York.....	1,398
Ohio.....	19	Michigan.....	9	North Dakota.....	157
Rhode Island.....	3	Minnesota.....	4	Ohio.....	710
		New York.....	35	Oklahoma.....	37
		Ohio.....	58	Rhode Island.....	241
		Oklahoma.....	28	South Dakota.....	98
		Rhode Island.....	5	Virginia.....	157

¹ Exclusive of New York City.

PLAGUE INFECTION IN FRESNO COUNTY, CALIF.

Under dates of October 20 and 22, 1937, Dr. W. M. Dickie, director of public health of California, reported plague infection proved by animal inoculation in a pool of organs from 14 chipmunks collected October 2 in the Billy Creek area, Huntington Lake district, Fresno County, Calif.; in a pool of 9 fleas from 1 *beecheyi* squirrel found September 13 on Fresno State College property, Huntington Lake; and in a pool of 197 fleas from 56 *beecheyi* squirrels collected September 20 at Lake Shore resort and at Huntington dump, 2 miles east of Huntington Lake.

WEEKLY REPORTS FROM CITIES

City reports for week ended Oct. 16, 1937

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	260	119	25	146	414	739	6	352	72	781	-----
Current week	161	91	35	298	473	589	3	391	56	673	-----
Maine:											
Portland	0	-----	0	0	3	0	0	1	0	4	23
New Hampshire:											
Concord	0	-----	0	2	4	1	0	1	0	0	11
Manchester	0	-----	0	0	0	0	0	0	0	0	10
Nashua	0	-----	0	0	0	0	0	0	0	2	3
Vermont:											
Barre	0	-----	0	5	0	0	0	0	0	0	4
Burlington	0	-----	0	0	0	0	0	0	0	0	7
Rutland	0	-----	0	0	0	0	0	0	0	4	4
Massachusetts:											
Boston	0	-----	0	8	16	23	0	5	0	10	180
Fall River	0	-----	0	0	2	4	0	0	0	10	24
Springfield	0	-----	0	1	0	1	0	0	0	7	30
Worcester	0	-----	0	1	2	2	0	1	0	2	45
Rhode Island:											
Pawtucket	0	-----	0	0	0	1	0	0	0	0	20
Providence	1	1	0	1	7	7	0	0	0	21	66
Connecticut:											
Bridgeport	0	-----	1	1	5	4	0	0	0	0	36
Hartford	1	-----	0	0	2	6	0	0	0	0	39
New Haven	0	-----	0	0	0	2	0	0	0	0	29
New York:											
Buffalo	0	-----	1	1	7	9	0	6	0	11	139
New York	19	8	4	29	91	31	0	64	12	79	1,375
Rochester	0	1	0	0	5	2	0	2	0	0	74
Syracuse	0	-----	0	0	7	4	0	0	0	1	60
New Jersey:											
Camden	0	-----	0	0	0	1	0	1	0	0	39
Newark	1	-----	0	0	5	3	0	6	0	18	94
Trenton	1	1	0	23	0	3	0	1	1	3	40
Pennsylvania:											
Philadelphia	1	3	0	4	23	27	0	23	8	30	467
Pittsburgh	5	4	2	49	12	30	0	7	1	15	137
Reading	0	-----	0	1	1	0	0	2	0	0	26
Scranton	1	-----	-----	8	-----	3	0	-----	0	5	-----

City reports for week ended Oct. 16, 1937—Continued

State and city	Diph- theria cases	Influenza		Meas- les cases	Pneu- monia deaths	Scar- let fever cases	Small- pox cases	Tuber- culosis deaths	Ty- phoid fever cases	Whoop- ing cough cases	Deaths, all causes
		Cases	Deaths								
Ohio:											
Cincinnati.....	5		2	3	7	5	0	5	2	9	128
Cleveland.....	0	8	2	14	12	35	0	9	3	25	182
Columbus.....	1		0	0	3	13	0	3	0	1	82
Toledo.....	2	1	1	3	2	5	0	2	0	15	62
Indiana:											
Anderson.....	0		0	4	1	9	0	0	0	1	11
Fort Wayne.....	0		0	0	2	2	0	0	0	0	18
Indianapolis.....	2		0	4	9	18	0	0	1	0	92
Muncie.....	0		0	0	1	0	0	0	0	0	14
South Bend.....	0		1	0	0	0	0	0	0	0	20
Terre Haute.....	0		0	0	0	3	0	0	0	0	14
Illinois:											
Alton.....	0		0	5	0	2	0	0	0	0	5
Chicago.....	11	2	2	23	35	51	0	31	3	54	660
Elgin.....	0		0	0	0	3	0	0	0	0	8
Moline.....	0		0	2	3	1	0	0	0	2	7
Springfield.....	0		0	0	2	2	0	0	0	0	23
Michigan:											
Detroit.....	13		0	17	27	52	0	16	1	46	242
Flint.....	0		0	2	3	8	0	0	0	7	34
Grand Rapids.....	1		0	4	4	11	0	0	0	5	38
Wisconsin:											
Kenosha.....	0		0	0	0	4	0	0	0	2	8
Madison.....	0		0	0	0	0	0	0	0	3	26
Milwaukee.....	0		0	10	1	9	0	6	0	44	92
Racine.....	0		0	1	0	2	0	0	0	1	6
Superior.....	0		0	0	1	0	0	0	0	3	7
Minnesota:											
Duluth.....	0		0	0	2	3	0	0	0	11	25
Minneapolis.....	2		0	1	6	17	0	1	0	11	99
St. Paul.....	8		0	1	8	1	0	4	0	5	66
Iowa:											
Cedar Rapids.....	0		0	0	0	0	0	0	0	6	
Davenport.....	0		0	0	0	1	0	0	0	0	
Des Moines.....	0		0	0	0	8	0	0	0	0	30
Sioux City.....	0		0	0	0	2	0	0	0	4	
Waterloo.....	0		0	0	0	5	0	0	0	0	
Missouri:											
Kansas City.....	1		0	0	9	7	0	6	0	2	97
St. Joseph.....	0		0	0	5	6	0	0	0	0	32
St. Louis.....	11		0	55	3	43	0	2	3	2	202
North Dakota:											
Fargo.....	0		0	0	1	1	0	0	0	18	9
Grand Forks.....	0		0	0	0	8	0	0	0	0	
Minot.....	1		0	0	0	1	0	0	0	1	4
South Dakota:											
Aberdeen.....	0		0	0	0	0	0	0	0	1	
Nebraska:											
Lincoln.....	0		1	2	3	1	0	0	1	0	56
Omaha.....	1		0	2	3	1	0	0	1	0	
Kansas:											
Lawrence.....	0		0	0	0	0	0	0	0	0	3
Topeka.....	0		1	0	2	6	0	0	0	5	26
Wichita.....	1		0	1	4	6	0	0	2	9	25
Delaware:											
Wilmington.....	1		0	0	3	5	0	1	0	0	26
Maryland:											
Baltimore.....	2	7	6	2	18	9	0	7	2	46	221
Cumberland.....	0		0	0	1	0	0	1	0	0	15
Frederick.....	0		0	0	0	0	0	0	0	0	5
Dist. of Col.:											
Washington.....	6	1	0	1	7	8	0	7	1	3	148
Virginia:											
Lynchburg.....	4		0	0	1	1	0	0	0	0	8
Norfolk.....	0		0	0	3	0	0	1	0	1	13
Richmond.....	2		2	0	2	3	0	2	0	0	46
Roanoke.....	0	4	0	0	2	0	0	0	0	2	13
West Virginia:											
Charleston.....	5		0	0	2	0	0	0	1	0	30
Huntington.....	1		0	3	0	2	0	0	0	0	
Wheeling.....	0		0	0	1	3	0	0	0	5	26
North Carolina:											
Gastonia.....	2		0	0	0	0	0	0	0	0	
Raleigh.....	0		0	0	1	0	0	0	0	4	11
Wilmington.....	0		0	0	0	0	0	0	0	7	11
Winston-Salem.....	0		0	0	0	2	0	1	0	0	13

City reports for week ended Oct. 16, 1937—Continued

State and city	Diph-theria cases	Influenza		Meas-les cases	Pneu-monia deaths	Scar-let fever cases	Small-pox cases	Tuber-culosis deaths	Ty-phoid fever cases	Whoop-ing cough cases	Deaths, all causes
		Cases	Deaths								
South Carolina:											
Charleston.....	0	5	0	1	0	1	0	0	5	0	21
Columbia.....	0	0	0	0	0	0	0	1	0	0	19
Florence.....	0	0	0	1	1	1	0	0	0	0	8
Georgia:											
Atlanta.....	5	7	0	0	5	10	0	4	1	3	61
Brunswick.....	0	0	0	0	0	0	0	0	0	0	4
Savannah.....	3	11	1	0	0	0	0	1	0	0	27
Florida:											
Miami.....	0	0	0	3	1	0	0	1	0	0	21
Tampa.....	0	1	1	0	0	0	0	0	1	1	19
Kentucky:											
Ashland.....	0	0	0	0	1	2	0	1	0	0	23
Covington.....	0	0	0	0	1	4	0	0	0	1	11
Lexington.....	0	0	0	5	0	0	0	1	0	5	21
Louisville.....	1	0	0	3	8	12	0	3	0	6	47
Tennessee:											
Knoxville.....	0	0	0	0	2	2	0	1	0	0	82
Memphis.....	2	0	0	3	0	4	1	2	2	2	70
Nashville.....	2	0	0	0	0	1	0	4	0	1	63
Alabama:											
Birmingham.....	7	4	1	0	7	6	0	2	0	0	58
Mobile.....	1	0	0	0	1	2	0	0	1	0	15
Montgomery.....	4	0	0	0	0	0	0	0	0	0	
Arkansas:											
Fort Smith.....	0	0	0	0	0	1	0	0	0	3	
Little Rock.....	0	1	0	1	1	1	0	0	0	0	
Louisiana:											
Lake Charles.....	1	0	0	0	2	0	0	0	0	0	5
New Orleans.....	7	8	4	0	9	1	0	18	0	9	131
Shreveport.....	2	2	0	0	8	3	0	2	0	0	39
Oklahoma:											
Muskogee.....	0	0	0	0	0	1	0	0	0	0	
Oklahoma City.....	2	0	0	0	1	3	0	1	1	2	42
Tulsa.....	0	0	0	0	0	8	0	0	0	22	
Texas:											
Dallas.....	3	1	1	1	2	4	0	3	0	3	67
Fort Worth.....	1	0	0	0	0	3	0	0	1	11	
Galveston.....	0	0	0	0	2	2	0	0	0	0	12
Houston.....	0	0	0	0	6	1	0	7	0	0	62
San Antonio.....	0	0	2	0	3	0	0	6	0	0	47
Montana:											
Billings.....	0	0	0	0	1	0	0	0	1	0	9
Great Falls.....	0	0	0	1	2	0	2	0	0	0	6
Helena.....	0	0	0	0	0	0	0	0	0	6	6
Missoula.....	0	0	0	0	0	0	0	2	0	0	7
Idaho:											
Boise.....	0	0	0	0	0	0	0	0	0	0	4
Colorado:											
Colorado Springs.....	0	0	0	1	0	2	0	0	0	2	12
Denver.....	4	0	0	9	9	9	0	5	0	2	84
Pueblo.....	0	0	0	0	1	0	0	0	1	6	8
New Mexico:											
Albuquerque.....	0	0	0	0	5	4	0	1	0	0	12
Utah:											
Salt Lake City.....	3	1	3	3	4	13	0	1	0	5	35
Washington:											
Seattle.....	1	0	0	0	8	3	0	1	0	10	86
Spokane.....	0	0	0	0	5	1	0	1	0	5	33
Tacoma.....	0	0	0	0	1	5	0	0	0	2	35
Oregon:											
Portland.....	0	0	0	2	3	2	0	2	0	1	71
Salem.....	0	0	0	0	0	0	0	0	0	0	
California:											
Los Angeles.....	14	13	0	8	14	18	0	14	0	29	299
Sacramento.....	1	0	0	1	0	2	0	1	0	8	30
San Francisco.....	0	0	0	3	5	5	0	7	0	34	159

City reports for week ended Oct. 16, 1937—Continued

State and city	Meningococcus meningitis		Polio- mye- litis cases	State and city	Meningococcus meningitis		Polio- mye- litis cases
	Cases	Deaths			Cases	Deaths	
Maine:				Nebraska:			
Portland.....	0	0	2	Omaha.....	0	0	2
New Hampshire:				Maryland:			
Nashua.....	0	0	1	Baltimore.....	3	1	0
Rhode Island:				District of Columba:			
Providence.....	0	0	1	Washington.....	2	1	2
Connecticut:				Georgia:			
New Haven.....	0	0	1	Atlanta.....	1	0	1
New York:				Kentucky:			
Buffalo.....	1	0	0	Ashland.....	1	1	0
New York.....	5	2	7	Tennessee:			
Syracuse.....	0	0	1	Knoxville.....	1	0	0
Pennsylvania:				Nashville.....	1	0	0
Philadelphia.....	0	0	8	Alabama:			
Pittsburgh.....	2	0	0	Birmingham.....	0	1	0
Ohio:				Arkansas:			
Cincinnati.....	0	0	1	Little Rock.....	0	0	1
Cleveland.....	1	0	2	Louisiana:			
Indiana:				New Orleans.....	0	0	1
Indianapolis.....	1	0	0	Texas:			
South Bend.....	0	0	1	Fort Worth.....	0	0	1
Illinois:				Houston.....	0	0	1
Chicago.....	1	1	7	Montana:			
Michigan:				Missoula.....	0	0	2
Detroit.....	0	0	6	Colorado:			
Flint.....	0	1	0	Denver.....	0	0	1
Grand Rapids.....	0	0	1	Pueblo.....	0	0	4
Wisconsin:				Utah:			
Milwaukee.....	0	0	9	Salt Lake City.....	0	0	1
Minnesota:				Washington:			
Duluth.....	0	0	1	Seattle.....	0	0	1
Minneapolis.....	0	0	5	Spokane.....	1	0	0
St. Paul.....	0	0	3	Oregon:			
Iowa:				Portland.....	0	0	1
Sioux City.....	0	0	1	California:			
Missouri:				Los Angeles.....	0	0	3
Kansas City.....	0	1	1	Sacramento.....	0	0	1
St. Joseph.....	0	0	1	San Francisco.....	0	0	3
St. Louis.....	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Providence, 1; New York, 2; St. Louis, 8; Baltimore, 1; Louisville, 1; New Orleans, 1; Denver, 1.

Fellagra.—Cases: Philadelphia, 1; Charleston, S. C., 1; Savannah, 2; Memphis, 1; Birmingham, 2.

Rabies in man.—Deaths: New Orleans, 1.

Typhus fever.—Cases: Atlanta, 2; Savannah, 3; Mobile, 1; Dallas, 1; Houston, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended October 9, 1937.—During the 2 weeks ended October 9, 1937, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis.....			1	4	2					7
Chicken pox.....		9		50	101	60	17	7	63	327
Diphtheria.....		1	8	102	14	11	6	1		143
Dysentery.....				3	4		8			15
Erysipelas.....				7			1			11
Influenza.....		14		2	1					29
Measles.....		31	2	68	87	5	15	22		303
Mumps.....		2			527	5	3	1		563
Paratyphoid fever.....		1			2					5
Pneumonia.....		1			19					30
Poliomyelitis.....		5	47	14	283	34	63	27		477
Scarlet fever.....		9	4	196	120	42	57	31		475
Trachoma.....										1
Tuberculosis.....	7	9	5	108	74	27	38	2	34	304
Typhoid fever.....		3	15	134	25	3	20	1	4	205
Undulant fever.....				1	11	2	2	1		17
Whooping cough.....		13		236	111	55	35	7	34	491

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for October 29, 1937, pages 1547-1562. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued November 26, 1937, and thereafter, at least for the time being, in the issue published on the last Friday of each month.

Cholera

China.—Cholera has been reported in China as follows: Week ended October 16, 1937, Annam Nghiloc, 4 cases; Hong Kong, 13 cases; Kwangchow Wan, 23 cases; Macao, 6 cases; Shanghai, 359 cases. Week ended September 25, 1937, Kwantung Leased Territory, Manchuria, 3 cases.

French Indochina.—During the week ended October 16, 1937, cholera was reported in French Indochina as follows: Haiphong, 169 cases; Hanoi, 71 cases; Tonkin Province, 973 cases.

Plague

United States—California.—A report of plague in California appears on page 1594 of this issue of PUBLIC HEALTH REPORTS.

Yellow Fever

Senegal.—During the week ended October 16, 1937, yellow fever was reported in Senegal as follows: Diakhao, 1 case; Rufisque, 1 case; Thies, 2 cases.